

U.G. 1st Semester Examination - 2021**STATISTICS****[HONOURS]****Course Code : STAT-H-CC-T-1****(Descriptive Statistics)**Full Marks : 50 (40+10) Time : $2\frac{1}{2}$ Hours*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.**Notations and symbols have their usual meaning.*1. Answer any **five** of the following: $2 \times 5 = 10$

- Find the variance of the first n natural numbers.
- Distinguish between ratio and interval scale of measurement.
- What are quartiles? Give a measure of skewness in terms of quartiles.
- If a variable assumes values a and b and $(n-2)$ other values are all equal to $(a+b)/2$, find the mean deviation about mean.

- Explain the time reversal test of an Index Number formula.
- What are ogives? How can you get a measure of central tendency with the help of ogives?
- The two regression lines for two variables x and y are $4x-6y+23=0$ and $14x-6y-32=0$. Find r .
- Give two measures of association between two attributes and indicate their ranges.

2. Answer any **two** of the following: $5 \times 2 = 10$

- Discuss the importance of choice of base period in constructing price index numbers.
- Define harmonic mean. If H_1 and H_2 be the harmonic means of two sets of positive observations, show that the harmonic mean of the combined set lies between H_1 and H_2 .
- Explain the principle of least squares in finding the regression of y on x . If Y be the least square linear regression of y on x , show that $r_{yY} = |r|$.
- Suppose two qualitative characters are categorized in a 2×2 contingency table. Suggest a suitable measure of association between them. Justify whether your suggested measure can be useful when one of the characters is quantitative.

[Turn over]

3. Answer any **two** of the following: 10×2=20

- a) i) Let s and R be, respectively, the standard deviation and range of a set of n values of x . Show that $R^2 / 2n \leq s^2 \leq R^2 / 4$.

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- ii) Define Yule's coefficient of association and coefficient of colligation and establish a relation between them. 5

- b) i) Using Cauchy-Schwarz inequality, show that $-1 \leq r \leq 1$. Interpret the two extreme cases. 5

- ii) Derive the angle between the two regression lines. 5

- c) i) What purpose is served by an index number? What are the different tests of consistency that a price index number should satisfy? 5

- ii) What is Quantile-Quantile (Q-Q) plot? Discuss the usefulness of this plot. 5

- d) i) What is Lorenz curve? How is this curve drawn? How can you get an indicator of the degree of concentration from this curve? 5

- ii) For a symmetrical frequency distribution of a discrete variable, show that the central moments of odd orders are all zero. 5

[Internal Assessment : 10]